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DISTINCTIVE FEATURE OF BLACKBIRD's TROPHIC DIET *(TURDUS MERULA MAURITANICUS,* Aves) AND ITS SEEDS SCATTERING ROLE IN SUBURBAN ENVIRONMENT NEAR ALGIERS

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ABSTRACT

This study concerns trophic diet of Blackbird (*Turdus merula mauritanicus*) performed in suburban outskirts Gardens of El Harrach, in Algiers Eastern, Sahel

As preys, these are Insecta (hymenoptera), Gastropods (Helicidae) and Myriapoda (Iulidae) which appear most represented. Analysis of droppings contents of this specie confirms its tendency to frugal-voracious and it's taking part of seed scattering of 13 vegetable species belonging to different families with dominance of Palmaceae, Moraceae and Rosaceae. Seeds of *Phillyrea angustifolia* spread into Blackbird's droppings are located and counted every day during August month.

Their number is estimated according to distance and orienteering from seeding tree. It is noted that higher seeds number is located at 40 meters from seeding-tree with 245 seeds. Maximal distance of dissemination reaches 200 meters. It is mentioned that south/west orienteering is better represented in terms of disseminated seeds with 218 seeds.

KEYWORDS: Algiers Sahel, *Turdus merula mauritanicus,* Trophic Diet, Scattering, Seed-Tree, Number, Distance

Résumé

Dans des jardins de la périphérie suburbaine d'El Harrach, dans l'Est du Sahel algérois le régime trophique du Merle noir (*Turdus merula mauritanicus*) est traité. Comme proies ce sont les Insecta (Hymenoptera), les Gastropoda (Helicidae) et les Myriapoda (Iulidae) qui apparaissent les mieux représentés. L'analyse des contenus des fientes de cette espèce confirme sa tendance à la frugivorie et sa participation dans la dissémination des graines de 13 espèces végétales appartenant à différentes familles avec une dominance des Palmaceae, des Moraceae et des Rosaceae. Les graines de *Phillyrea angustifolia* dispersées dans les fientes du Merle noir sont repérées et comptées chaque jour durant le mois d'août. Leur nombre est estimé en fonction de la distance et de l'orientation par rapport à l'arbre semencier. Il est à remarquer que le nombre le plus élevé de graines est repéré à 40 mètres du semencier avec 245 graines. La distance maximale de dissémination atteint 200 mètres. Il est à mentionner que l'orientation sud-ouest est la mieux représentée en termes de graines disséminées avec 218 graines.

Motsclés: Sahel algérois, *Turdus merula mauritanicus,* régime trophique, dissémination, arbre semencier, nombre, distance.

INTRODUCTION

Trophic type of *Turdus merula***.** Linné, 1758 has been attentive to several authors as MAGNAN (1911),

MENEGAUX (1937), MAYAUD in GRASSE (1950); SPIRHANZL-DURIS and SOLOVIEV (1969). BOLOGNA (1980), HERRERA (1981); DEBUSSCHE and al (1985), THERY (1989) and RICCI and IMPCF (2005).

In Algeria some studies are performed on trophic behaviour of *Turdus merula mauritanicus* Madarasz, 1903 as those of DOUMANDJI and DOUMANDJI-MITICHE (1994), SMAI and DOUMANDJI (1999) and BELKOUCHE (1996, 2001). Several works highlight frugal-voracious of species belonging to *Turdidae* family and their taking part in seeds scattering (HERRERA, 1981, DEBUSSCHE and ISENMANN, 1985a, b; DEBUSSCHE and al 1985; THERY, 1989). In Algeria, El-Harrach suburban SMAI (1996) was interested by diet of three *Turdidae Turdus merula mauritanicus, Luscinia megarhynchos* (Brehm, 1831) and *Erithacus rubecula* (Linné 1758).This author shows that those birds are highly frugal-voracious and they intervene in seeds scattering.

Concerning ornithochory exercised by *Turdus merula mauritanicus* and by *Sturnus vulgaris* (Linné, 1758), in Algiers region, it is useful to remember researches led by BELKOUCHE and al (1996, 1997a, b, 1999). BELKOUCHE and DOUMANDJI (1997, 1999) OUABBAS-BELKOUCHE and DOUMANDJI (2003, 2006, 2007, 2011). Elsewhere in Algeria, researches on ornithochory remain very rare. Present study is aimed towards relations existing between *Turdus merula mauritanicus* and fruit in suburb environment.

METHODOLOGY

Study station is composed by experimental plots and green spaces of Agronomical Upper National School of El Harrach (36°43'B, 3° 08'E). It is situated in eastern side of Algiers Sahel. It is a suburban heterogenic environment, veritable collection of ornamental plants formed by three strata, first one herbaceous composed particularly of Poaceae, and of Fabaceae, the second shrub composed of Rosaceae, of Oleaceae and of Moraceae ant the third one arborescent with Palmaceae as *Washingtonia robusta. W.Filifera* and of *Eucalyptus.*

Yearly, rain-gauge is about 600 to 800 mm and yearly average temperature of 17.6°c. Region is situated on bioclimatic stage, sub-wet with soft winter to tempered climate by Mediterranean Sea proximity.

On the ground in squaring of 10 ha, each dropping contains at least a seed of *Phillyrea angustifolia* is exactly located on a plan in respect of orienteering according to seeding tree and of distance which separates it from dropping found. Droppings' harvest of *Turdus merula* containing other seeds belonging to various vegetable species are kept in paper cornets on which, harvest date, and exact spot are mentioned.

In laboratory, analysis is made by putting each dropping in Petri box. Those are separately steeped in some cubic centimetre of ethanol at 70° during 10 minutes. Then their content is ground to be able to separate sclerotic pieces of Arthropods, parts of Gastropod coquille and vegetable fragments. After ethanol evaporation, grid of Petri box bottom is done to determine and count invertebrates by use of magnifying glass.

Determination of insects' fragments is made by one of us[2.] The one with seeds found in droppings is made with help on reference collection prepared in advance. Results obtained are exploited with help of diversity indexes which the first is total richness (S) that is total number of species found in all droppings.

Also it is considered Shannon-Weaver's diversity index (H), being as the best ways to express assembly's diversity (BLONDEL and al, 1973) and which is obtained by formula: $H' = - \sum qi \log_2 qi$ where H' is index of diversity expressed in bits and qi relative frequency of specie i taken in consideration.

Equitability index (E) is link of observed diversity (H') to maximal diversity. (H' max) (BLONDEL1979). Maximal diversity is given by formula H' max = $\log_2 S$ where S is total richness (WEESIE and BELEMSOBGO, 1997). Equitability varies between 0 and 1.

Furthermore, as statistical method, factorial analysis of correspondences is used. It allows specifying sharing out norms of ecological universe where numerous species have to intervene It widely justify simultaneous species representation (BLONDEL, 1979).

Factorial analysis of correspondences aims to gather in one or several graphics the largest part of information contained in tableau (DELAGARDE, 1983)

Variance analysis VAAN is defined as being comparison method of averages. Variance of statistical series or of frequencies allocations is average of squares differences according to average. (VILAIN, 1999).

In the present study, use of variance analyse is performed in function of seeds number scattered by Blackbird, of their sizes and the distance of scattering of each vegetable specie ingested and scattered by *Turdus merula*.

RESULTS

Content analysis of *Turdus merula's* droppings in suburban gardens of El Harrach highlights presence of two parts, the first one corresponds almost to two third and other vegetable equal to third. Among categories forming animal part, this of Insecta is dominating with more a half of ingested preys. Vegetable part is not neglected and passes in second position with 2/5 of menu (Figure 1)

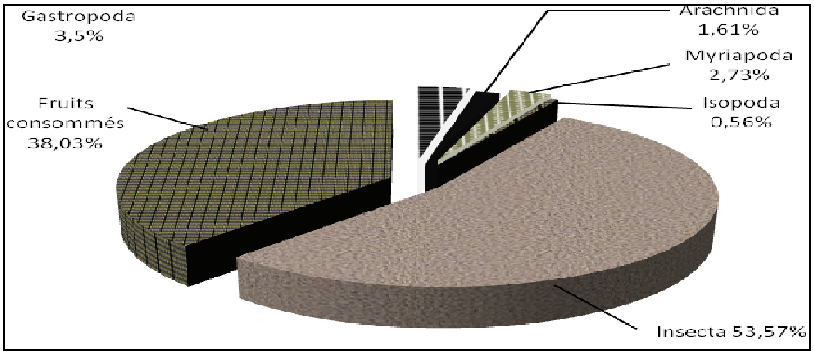

Figure 1: Relative Abundances of *Turdus merula's'* trophic Categories in Garden of Agronomical Upper National School (AUNS) (312 Droppings)

Hymenopterans with *Blastophaga Psenes* (Linné, 1758) are particularly more consumed with rate of 4/5 of the whole ingested Insecta. In reality, blastophaga is ingested by Blackbird at the same time with *Ficus retusa* fruit (Linné, 1767). Preys belonging to order of Coleopteran, of Dermaptera and Blattodea are not much ingested by Blackbird. It is possible that first ones have to be weakly attractive because of their integuments hardness, as for the following which are generally nocturnal, although *Turdus merula* is diurnal. Chances to be met are reduced.

Yet locusts with their flabby integuments are activating along daylight. Bur they are rarely ingested by Blackbird. This rarity would be due to jumping behaviour of Orthopteras that allows them to avoid predator attacks (tableau 1).

Tableau 1: Rates of different order of insects ingested by Blackbird in garden of Agricultural Upper National School of El Harrach (AUNS) (312 Droppings).

It is mentioned that 2/5 of animal preys out of ingested insects by Blackbird are Gastropods. They are Helicellidae and Helicidae. Myriapoda class intervenes with ***Iulus*** gender followed by Arachnidan and by Crustaceans (tableau 2).

Tableau 2: List of ingested animal preys consumed by Blackbird in Garden of Agronomical Upper National School of El Harrach (AUNS) (312 droppings).

Number of Preys individual's varies from month to another. It is higher in September with 170 individuals (30 droppings) followed by June with 137 individuals (19 droppings). May month presents a number of 110 preys (19 droppings) and in October with 106 individuals. Inventoried populations during other months are too much modest, lower than 100. Monthly values of total richness are fluctuating.

They are strongest in June with 31 species (19 droppings) and in August with 30 species (30 droppings).

They appear lowest with 27 species in May (19 droppings) and in July (30 droppings) and in April (30 droppings) with 26 species. They are weaker during other months (tableau 3).

Tableau 3: Total richness and preys number by dropping and by month obtained in Garden of Agricultural Upper National School olf El Harrach (AUNS) (N = 312 droppings).

Values of Shannon: Weaver diversity index are high during most of the months, particularly in June with 4.85 bits. The lower level is of 1.67 bits during September. Monthly values of equitability are near of 1 (Tableau 4).

Tableau 4: Monthly values of diversity indexes and equitability in function of species in gardens of Agricultural Upper National School of El Harrach (AUNS) (N = 312 droppings).

Factorial analysis of correspondences reveals that months of January, February, March, May and October are gathered in quadrant 1 which is explained those, compositions of droppings in preys of those months are comparables. Quadrant 2 contains months of July and December. As for August, it is alone situated in quadrant 3. April and June months appear in quadrant 4. September month is put between quadrants 2 and 3.

At extreme right of axe 1, hot and dry months of July and August are found. On the opposite side, at extreme left, there is April, cool month and rainy. It is established along axe 1with double gradient, one thermal, increasing from the left to the right and other with decreasing rain-gauge going from the left towards right.. It also appears climatic gradient along axe 2, particularly decreasing thermal from bottom to top (Figure 2).

Figure 2: Factorial analysis of correspondences relating to months in the gardens of Agricultural Upper National School (AUNS) (312 droppings).

On graphic representation carrying preys, extreme right of axe 1 is constituted by group A consisted of *Psocoptères* (017), *Cicadetta montana* (025) *and* Acari sp. indét.(026).that are frequenting all environment at one and the same time.

Extreme left of axe 1 is formed by group B of 5 species which are. Podurata (011), Silpha sp. (040) et *Apoidea* (050) which become fond of spots with wet grounds.

For that reason, it is established along axe 1, increasing dampness gradient from the right to the left. Relating to axe 2; it is characterized in positive part by specie *Polydesmus denticulatus* (009). In negative part, there is Pentatomidae

(022), Coccinellidae (033), Chrysomelidae *sp* (034), *Hister major* (045), *Plagiolepis barbara* (055*) and Crematogaster sp* (066) (Figure 3) (Annexe 1).

Figure 3: factorial analysis of correspondences in function of preys ingested in gardens of Agricultural Upper National School of El Harrach (AUNS) (312 droppings).

Annex 1: Applied code of preys in factorial analysis of correspondences in gardens of Agricultural Upper National School of El Harrach (AUNS).

It is noted high consumption of fruit by *Turdus merula*. Ingested vegetable species belong to different families notably those of *Arecaceae,* and *Rosaceae.*

Most sought-after fruit are *Phoenix canariensis* with 201 fruit, followed by sycones of *Ficus retusa* with 196 fruit (36, 1 %).This important ingestion of dates and figs is due to Blackbird's attraction by those fruit with notable abundance (Tableau 5).

Tableau 5: List of vegetable species consumed by *Turdus merula* in gardens of Agricultural Upper National School of El Harrach (AUNS) (312 droppings).

Turdus merula specie participates to scattering of 12 vegetable species in gardens of El Harrach, (tableau 6). Scattered specie in large quantity is *Ficus retusa* from January until December with average of 829 seeds by month with minimal amplitude of 51.9 m according to potential seeder and maximal amplitude of 187.8m. *Morus nigra* seeds take second place with middle monthly number of 55 seeds with minimal scattering distance of 51.3m.

Seeds of *Cotoneaster racimosa* are found in *Turdus merula's* droppings during months going from January to March corresponding to average number of 16 seeds by month avec scattering minimal amplitude of 56m and maximal amplitude of 199m.

During all the year, dates of *Phoenis canariensis* are ingested, then scattered with monthly average number of 15 seeds within a radius of maximal scattering of 236m. In September, it is noted that 8 seeds of Washingtonia *filifera* are scattered in September.

They are found in dropping distant from the nearest seeder between 152.4m and 297.2m. *Ficus rubiginosa* is found in December with 8 seeds distant of 30m from main seeder. Seeds of *Ligustrum japonica*, of *Schinus molle*, of *Celtis australis*, of *Rhamnus alaternus* and of *Solanum nigrum* are weakly scattered.

Tableau 6: Numbers and amplitudes of seeds scattering by *Turdus merula* noted in droppings in Garden of Agronomical Upper National School of El Harrach (AUNS).

Exploitation of results bearing on plants seeds scattered by Blackbird in function of their numbers, of their sizes, and of the scattering distance is performed through variance analysis (Tableau 7).

Tableau 7: Treatment of vegetable species seeds scattered by Blackbird through variance analysis in function of their numbers, of their sizes and of the scattering distance

Value of calculated F is equal to 0.37.It is inferior to theoretical F(1.80) (Table 7). For that reason, there is no significant difference between vegetable species scattered by Blackbird.

Seeds populations of *Phillyrea angustifolia* progressively decrease and as observant moves away from seeder-tree and increase near the tree that playing roost role (Table 8). Higher number of scattered seeds is point out at 40m at South-West of seeder-tree with 211 seeds followed by 66 seeds gathered at North-East of the tree at less 20m. A unit of 56 seeds of *Phillyrea* is to be noted in South-East of seeder-tree at 100 m distance. Higher amplitude mentioned for only one seed is of 200m in South-East from seeder-*Phillyrea*.

Relative abundance of seed in function of the distance, shows that at 40m, greatest number is counted which is 245 seeds (52.0%). In function of orientation, it is noted that North-West is most represented with 218 seeds (46.3%), followed by South-West with 160 seeds (34.0%).

Number of seeds by dropping may vary between 1 and 11. Seeds scattering of *Phillyrea angustifolia* is made in all directions and at different distances. Number of rejected seeds increases under roost trees.

Tableau 8: Seeds populations of *Phillyrea angustifolia* scattered by *Turdus merula* in function of distance and of orientation according to seeder-tree in gardens of Agricultural Upper National School of El Harrach (AUNS).

DISCUSSIONS

Blackbird's diet in Garden of AUNS of El Harrach is dominated by Insecta and fruit. DOUMANDJI and DOUMANDJI- MITICHE (1994) note that several species belonging to Turdidae can find themselves classified in tropic category of polyphagia, notably thrushes *Turdus viscivorus* and*Turdus philomelos*, blackbirds *Turdus merula* and *Turdus torquata*, some wheatears and robin *Erithacus rubecula*. In fact, MENEGAUX (1937) noted that blackbird's diet is composed as well as with animal part as vegetable part during hot days. Elsewhere, RICCI (2005) reveals that diet varies during seasons but it is composed by grubs and by insects imagos, spiders, Myriapoda; small snails, earthworm and fruit, apple, pear, cherry, strawberry, raspberry; redcurrant, berry of cotoneaster, ivy, juniper, sorb, mulberry, yew, mistletoe, holly, and elder. In the same sense HERRERA (1981) in Spain underlines frugal-voracious of *Turdus merula* which asks for 14 vegetable species belonging to 11 different families as *Arbutus unedo, Ficus carica, Olea europea,* and *Pistacia lentiscus. Turdus merula's* attraction by fruit catches attention of THERY (1989) in per urban zone of Brunoy in Essone France. He pointed out during annual circle that diet of this specie is composed by 32% of fruit belonging to 21 vegetables species. Seeds of 17 species are found in droppings or in collected regurgitated.

Results of analysis of 84 crops or *Turdus merula* coming from South-East France by ROUX and BOUTIN (2012) highlight that vegetable fraction corresponds to 17 species which is the largest part of menu. Nevertheless, animal fraction is not neglected (28.4%), including notably gastropods and arthropods. According to WILLIAMS (2006) Blackbird ingests big number of insects, earthworms, and fruit available in its habitat.

Shannon-Weaver index values are high in gardens or Agricultural Upper National School. They fluctuate between 1.67 and 4.85 bits. Equi-distribution is near 1.

Blackbird as frugal voracious specie helps to seed scattering. It participates to dispersal *Phillyurea angustifolia's* seeds at the same time to those of 13 plants species observed in droppings of this Turdide in Garden of El Harrach peripheries. According to MAYAUD (1950), birds which contribute to seed dispersal are particularly frugal-voracious. They mainly belong to Turdidae, to Sylviides, to Pycnonotides and to Sturnides.

Species of Turdidae family which scatter seeds are notably robin *Erithacus rubecula* (DEBUSSCHE and ISENMANN, 1985a; SMAI and DOUMANDJI, 1997), thrush *Turdus philomelos* (DEBUSSCHE and ISENMANN, 1985b) and Blackbird *Turdus merula* (BELKOUCHE, 1996; SMAI et DOUMANDJI, 1999).

Likewise THERY (1989) reports that several birds' species participate to dispersal of seeds notably those of fruit consumers guild in Brunoy (France) This guild is composed by birds of middle size as *Turdus merula*, *Turdus philomelos* et *Sturnus vulgaris* and small size as Sylvia *atricapilla* and *Erithacus rubecula.*

According to DEBUSSCHE and al (1985) dispersal is assured by adult breeding birds and by their young. Number of scattered seeds in function of distance compared with seeds-bearing does not follow exponential decreasing according the same authors who specify moreover that exist privileged zones which are favoured by their structure and by their botanic composition, exercising on bird's strong attraction. Among those particular spots BLONDEL (1986) quotes roosts and shelters.

On the other hand, DEBUSSCHE and al (1985) think that seeds density exponentially decreases by keeping away from seed's source. Several authors estimate that advantage which could beneficiate plant will be improvement of germination capacity of seeds and growing of their germination speed thanks to passage by digestive tube of the scattering bird, and so remoteness of seeders and scattering no random in favourable sites (DEBUSSCHE, 1985).

CHARLE-DOMINIQUE (1995) show that usually major part of dispersal is done within a radius of some ten to hundred meters, which is sufficient to find adequate biotype to germination and to development of seedlings, far from mother foot. TRECA and TAMBA (1987) confirm that behaviour of birds allows deposit of seeds in favourable site to their germination and to survival of seedling under Acacia for example.

Elsewhere, they underline fertilisation contribution by birds' droppings. Consumption of fruit pulp is followed with frugal voracious birds by partial transit or total in digestive tract. This fact allows improvement of digestive power and of shortness of delays. It is to remember that seeds disseminating by Blackbird in forest environment is beneficial. But in gardens and in agricultural units its dispersal action of Diasporas is harmful.

CONCLUSIONS

Considering that *Turdus merula* presents varied trophic diet which means that it consumes drupes and bays belonging to varied botanical species, this Turdidae goes to confine in rich gardens in ornamental plants In those spots, gardeners will have much work to eliminate undesirable vegetables appearing after seeds disseminating. Farmer will have interest to include market gardening or fodder between his orchards and attractive gardens.

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APPENDICES

Tableau 1: Rates of Different Order of Insects Ingested by Blackbird in Garden of Agricultural Upper National School of El Harrach (AUNS) (312 Droppings)

Order	Number	Percentage
Hymenoptera	591	77,25
Coleoptera	86	11,24
Hemiptera	31	4,05
Dermaptera	18	2,34
Orthoptera	5	0,65
Blattoptera	4	0,52
Diptera	4	0,52
Lepidoptera	4	0,52
Homoptera	3	0,39
Psocoptera	1	0,13
Thysanoptera	1	0,13
Podurata	1	0,13
Insect unspecified	16	2,09
Total	**765**	**100**

Tableau 2: List of Ingested Animal Preys Consumed By Blackbird in Garden of Agronomical Upper National School of El Harrach (AUNS) (312 Droppings)

Class	Species Consumed	Number	AR %
Gasteropoda	Helicellidae	26	21,14
	Helicidae	18	14,63
	Cochlicellabarbara	2	1,63
	Helixaspersa	2	1,63
	Otalasp	2	1,63
	Total	50	40,65
Arachnida	sp.1 ind	1	0,81
	Aranea sp.1 ind.	1	0,81
	sp.2ind.	1	0,81
	sp.3ind.	1	0,81
	sp.4ind.	4	3,25
	sp.5ind.	7	5,69
	sp.6ind.	4	3,25
	sp.7ind.	2	1,63
	sp.8 ind.	2	1,63
	Total	**23**	**18,70**
Myriapoda	sp. ind.	1	0,81
	Iulus sp	29	23,58
	Polydesmus denticulatus	9	7, 32

	Total	**39**	**31,71**
Crustacea	sp. ind	1	0,81
	Isopoda	8	6,50
	Total	9	7,32
Arthropodaind	sp.1 ind.	1	0,81
	sp.2 ind.	1	0,81
	Total	**2**	**1,62**
Total		**123**	**100**

ind.: unspecified; A.R. % : relatif abundance

Tableau 3: Total Richness and Preys Number by Dropping and by Month Obtained in Garden of Agricultural Upper National School of El Harrach (AUNS) (N = 312 Droppings)

Months / **Parametr**	**I**	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**	**IX**	**X**	**XI**	**XII**
Droppings number	24	28	30	30	19	19	30	30	30	27	15	30
N	20	34	23	58	110	137	93	82	170	106	26	70
S	9	19	14	26	27	31	27	30	22	20	13	18

N: preys number; S: total richness

Tableau 4: Monthly Values of Diversity Indexes and Equitability in Function of Species in Gardens of Agricultural Upper National School of El Harrach (AUNS) (N = 312 Droppings)

Months / **Parametr**	**I**	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**	**IX**	**X**	**XI**	**XII**
H' (bits)	2,55	4,06	3,47	4,11	3,26	4,85	3,37	3,94	1,67	2,11	2,88	3,01
H'max bits)	3,16	4,25	3,81	4,70	4,75	4,95	4,75	4,91	4,46	4,32	3,70	4,17
E	0,57	0,96	0,91	0,87	0,69	0,98	0,71	0,80	0,37	0,49	0,67	0,72

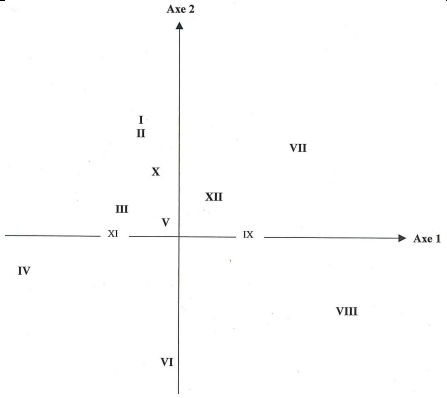

Figure 2: Factorial Analysis of Correspondences Relating to Months in the Gardens of Agricultural Upper National School (AUNS) (312 Droppings)

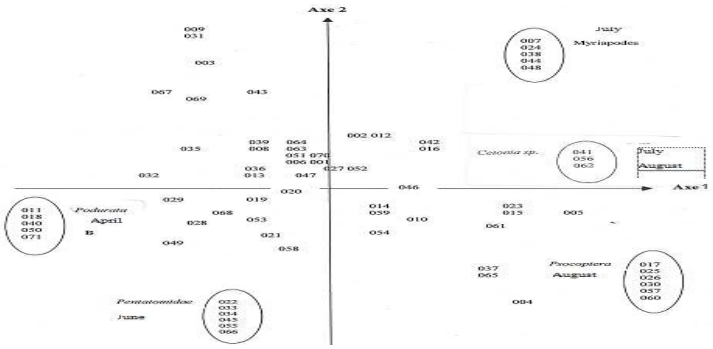

Figure 3: Factorial Analysis of Correspondences in Function of Preys Ingested In Gardens of Agricultural Upper National School of El Harrach (AUNS) (312 Droppings)

Tableau 5: List of Vegetable Species Consumed by *Turdus merula* in Gardens of Agricultural Upper National School of El Harrach (AUNS) (312 Droppings)

Family	Vegetable Species	Numbers	AR (%)
Arecaceae	*Phoenix canariensis*	201	37,02
	Washingtonia filifera	17	3,13
	Washingtonia robusta	11	2,03
	Phoenix sp.	2	0,37
	Palmaceae sp.	5	0,92
Moraceae	*Ficus retusa*	196	36,10
	Morus nigra	16	2,95
Rosaceae	*Ficus rubiginosa*	1	0,18
	Cotoneaster racimosa	34	0,18
Oleaceae	*Crataegus* sp.	1	6,26
	Ligustrum japonicum	18	3,13
Anacardiaceae	*Phillyrea angustifolia*	6	1,10
	Schinus molle	9	1,66
Rhamnaceae	*Schinus* sp.	1	0,18
	Rhamnus alaternus	2	0,37
Ulmaceae	*Celtis australis*	2	0,37
	Solanum nigrum	1	0,18
Solanaceae	Fruits sp.	20	3,68
Family unspecified	unspecified		
	Total	**543**	**100**

A.R. %: relatif abundance

Tableau 6: Numbers and Amplitudes of Seeds Scattering by *Turdus merula* Noted in Droppings in Garden of Agronomical Upper National School of El Harrach (AUNS)

Family	Scattering Species	Seeds Mean Size (Mm)	Seeds Mean Numbers/Mois	Amplitudes Mean (M)		Période of Scattering
				Minimal	Maximal	
Moraceae	*Ficus retusa*	2	829	51,92	187,83	I – XII
	Morus nigra	2,5	55	51,28	120	VI - IX
	Ficus rubiginosa	-	8	30	30	XII
Rosaceae	*Cotoneaste rracimosa*	4	16	56	199	I – III
Arecaceae	*Phoenix canariensis*	15	15	64,43	235,99	I – XII
	Washingtonia filifera	4	8	38,7	139	IX
	Washingtonia robusta	5	7	152,4	297,2	IX
Oleaceae	*Ligustrum japonica*	5	4	47,8	70,7	I – VI
Ulmaceae	*Celtisaustralis*	7	2	-	200	IX
Anacardiaceae	*Schinus molle*	3,5	2	89,9	182	II-III / VIII-IX
Rhamnaceae	*Rhamnus alaternus*	5	1	65	185	V – VI
Solanaceae	*Solanum nigrum*	2	1	-	215	II

Tableau 7: Treatment of Vegetable Species Seeds Scattered by Blackbird through Variance Analysis in Function of their Numbers, of their Sizes and of the Scattering Distance

Source	Ddl	Somme Des Carrés	Carrés Moyens	F De Fisher	Pr > F
Model	13	290097,063	22315,159	1,153	0,372
Remainder	22	425894,747	19358,852		
Total	35	715991,811			

Tableau 8: Seeds Populations of *Phillyrea angustifolia* Scattered by *Turdus merula* in Function of Distance and of Orientation According to Seeder-Tree in Gardens of Agricultural Upper National School of El Harrach (AUNS)

Distance (m)	0	20	40	60	80	100	120	140	200	Total	AR (%)
North-East	66	0	0	0	0	0	0	0	0	66	14,01
North-West	9	4	3	0	0	0	0	0	0	16	3,40

Tableau 8: Contd.,

South-East	14	19	20	11	3	56	35	1	1	160	33,97
South-West	2	1	211	4	0	0	0	0	0	218	46,28
south	0	0	0	11	0	0	0	0	0	11	2,34
Total	91	24	245	15	3	56	35	1	1	471	100
AR (%)	19,32	5,10	52,02	3,18	0,64	11,89	7,43	0,21	0,21	100 %	

A.R. %: relatif abundance

Annex 1: Applied Code of Preys in Factorial Analysis of Correspondences in Gardens of Agricultural Upper National School of El Harrach (AUNS)

001-Helicellidae	037- Carpophilidae
002- Helicidae	038- Cerambycidae
003- *Cochlicella barbara*	039- *Coccotrypes dactyliperda*
004- *Helix aspersa*	040- *Silpha* sp. ind.
005- *Otala* sp. ind.	041- *Cetonia* sp. ind.
006- Araneida	042- *Aphodius*
007- Myriapoda	043- *Drillus mauritanicus*
008- *Iulus*	044- Dermestidae
009- *Polydesmus denticulatus*	045- *Hister major*
010- Isopoda	046- Hymenoptera
011- Podurata	047- *Blastophaga psenes*
012- Blattoptera	048- Ichneumonidae
013- *Gryllus bimaculatus*	049- Apidae sp. ind.
014- *Eyprepocnemis* sp. ind.	050- Apoideasp. ind.
015- Dermaptera	051- Formicidae sp. ind.
016- *Anisolabis mauritanicus*	052 – *Pheidole pallidula*
017- Psocoptera	053- *Messor barbara*
018- Thysanoptera	054- *Tapinoma simrothi*
019- Hemiptera sp. ind.	055- *Plagiolepis barbara*
020- Cydninae	056- *Cataglyphis bicolor*
021- *Sehirus*	057- *Cataglyphis* sp. ind.
022- Pentatomidae	058- *Tetramorium biskrensis*
023- Coreide	059- *Monomorium salomonis*
024- Cicadellidae	060- *Monomorium* sp. ind.
025- *Cicadetta montana*	061- *Aphaenogaster testaceo pilosa*
026- Acarien sp. ind.	062- *Aphaenogaster* sp. ind.
027- Coleoptera sp. ind.	063- *Camponotus barbaricus xanthomelas*
028- Carabidae sp. ind.	064- *Camponotus* sp.
029- Scarabeidae sp. ind.	065- *Crematogaster scutellaris*
030- *Phyllognatus* sp. ind.	066- *Crematogaster* sp.
031- Staphyllinidae sp. ind.	067- Lepidoptera sp. ind.
032- *Ocypus olens*	068- Diptera sp. ind.
033- Coccinellidae sp. ind.	069- *Lucilia* sp. ind.
035- Chrysomelidae sp. ind.	070- Insectes sp. ind.
036- Curculionidae sp. ind.	071- Arthropoda sp. ind.

ind. unspecified